CLASSIFICATION SECRET [redacted] 25X1

CENTRAL INTELLIGENCE AGENCY REPORT NO. [redacted] 25X1

INFORMATION REPORT

CD NO.

COUNTRY USSR

DATE DISTR. 3 / Aug 1950

SUBJECT Geological and Geophysical Exploration

NO. OF PAGES 4

PLACE ACQUIRED ---

NO. OF ENCLS. (LISTED BELOW)

25X DATE ACQUIRED BY SOURCE [redacted]

SUPPLEMENT TO REPORT NO.

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DATE OF INFORMATIO [redacted]

1. Administration--In the USSR all exploration work of any kind comes under the corresponding Ministry. If an institution thinks an area needs exploration, a program of the expedition needed is made up and sent to the Ministry for its approval. If the Ministry should form this request, the institution in turn approves the project and supplies the money, personnel, and equipment. There is no time lag and once the request is approved the mechanism is set in motion for the preparation of the trip. If the expedition is very large, the head man is from the Party membership and acts as an administrator. He would have as his first deputy a geologist who is responsible for all the technical work and is free and independent in this respect. On smaller parties a geologist is the leader of the expedition. The head of the expedition makes a list of all equipment needed and submits it to the supply section for purchase. It is up to the head to determine how much time is required for advanced study of the area to be explored and the time needed for preparations. All technical personnel come from Leningrad, Moscow, and other centers; and the laborers are hired at the job site, if available. The Ministry has the final say on the transfer of technical people regardless of individual views. If an expedition has not completed its work in a year or two or is established as permanent, then the head man is sent back to the institute and another is sent in his place. The leader of the expedition, after one year, must send out a preliminary report; the next report is due in six months. Reports containing factual data are not published, but if data is theoretical, it is printed and published. If an individual geologist's report is found good enough and does not contain any classified material it can be published. (In each institute there is a branch of publications.) Independent field parties are allowed to go out from the main party and subbases can be established away from the main base. Expeditions with a geological mission would include geologists, geophysicists, paleontologists, petrologists, topographers, surveyors, astronomers, etc, all under the jurisdiction of the head geologist.

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2. Geophysics--Geophysical exploration is always used in oil prospecting. A prospective well would never be considered without previous work of this kind.

(a) Field parties--These parties are in command of the chief, who is responsible for the work, and several engineers and laborers. The exact number of personnel naturally depends on the extent and type of work to be done. Often these parties include university students for part-time work, and they have the status of technicians. These parties may include geologists, geophysicists, topographers, astronomers, and surveyers. Depending on the type of work to be done, their hours of work are from sunup to sundown if possible; or when the days are long, from twelve to sixteen hours a day. This depends on the weather, though they are able to work at 50°C below because of the protective clothing developed for such low temperature. The only weather element that stops their work is a blizzard. The heads of the various parties would write their reports and label and log the rock samples according to definite instruction. They would be submitted to the chief geologist for his analysis and incorporation into his report.

(b) Equipment--I am not too familiar with the equipment used by the Soviets nor am I familiar enough with the US equipment to state whether they used any new or different types from the US. What they did use was bought from the Germans or French and then copied. Geophysical instruments were also developed in the office of Geophysical Surveying (Kontora Geofizicheskikh Razvedok) under the Ministry of Geology. They never have used US equipment. The equipment that the Soviets used is inferior in all ways to foreign equipment despite the fact that this material is copied from them. The instruments that are used are:

Magnetometer (both air and ground)
Gravimeter
Seismometers
Pendulums

I did not see the dip needle used. The weather did not affect the equipment either mechanically or its sensitivity to any great degree in the Arctic. The only difficulty they had was in keeping the instruments at a constant temperature. This was remedied as much as possible by erecting tents around the instruments. Corrections for the low temperature expected were established in laboratories before the expedition started.

(c) Methods used in Prospecting--

Resistivity: This form of electrical prospecting was not used for surface work in the Arctic regions due to the fossil ice and permafrost areas. It was used, however, in drill holes (Schlumberge Method) that extended below these layers. Resistivity was used in the southern regions of the USSR, [illegible].

Self Potential: This again was not used in the regions of fossil ice and permafrost except in drill holes which extended below these layers. This method is used extensively for mineral exploration.

Seismic: Both refraction and reflection methods are used in their work. The Arctic Regions presented difficulties in the use of this method due to the [illegible] surfaces, different layers of ice, and material imbedded in the ice. Another difficulty encountered was that seismic readings through ice differentiated by those through salt, both being 4500 meter per second.

Magnetic: This method was used for general or large scale prospecting. They would use about 10 stations in one square kilometer (.39 square miles). Three types of readings are taken to judge the strike of formations as much as possible. The magnetometer is used extensively for locating iron formations. Magnetic observations are very important in the Arctic in connection with [illegible] magnetism. All care was taken to protect the instruments [illegible] in tents or sleds. The protection consisted chiefly in keeping them at a constant temperature in winter (40° to 50°).

Gravimetric: This method was used when detailed mapping was necessary to get structure, good contacts between formations, between formations and salt domes, and to obtain angles at which salt domes dipped. Equal magnetic intensity could only be found by this method. [redacted] the

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application of gravimeter methods in finding good structures in the Emba region. When mapping with this method in the Arctic, four of five readings had to be taken around a station and an average made to represent the reading of this station. This was due to the various thicknesses of the fossil ice.

25X1 Pendulum: [redacted] this method in showing the flatness of the formations between the salt domes in the Emba region. Used in detailed work in European USSR to study the deepness, structure of the crystalline fundamental basin.

Gas analysis: This was used to determine the hydrocarbons in the soil. Air was taken from the soil and analyzed for heavy hydrocarbons. This method has been used for the past fifteen years. The Arctic region is not suited for this type of analysis.

Geochemical: Before World War II, this type of exploration was experimental, but during the war it came into use. The methods used now are the same as those used by the US.

B. Machinery--

(a) Field Parties: These parties have the same setup and operate under the same rules and conditions as the Geophysical parties mentioned above. The geologists outrank the geophysicists or any other technical men in the part.

(b) Methods used in Prospecting--

Trenching: This was used for detailed work. From this was obtained the dip and strike of the formations. It is used extensively in regions where outcrops are hidden under the ice.

Plane table: This was also used for detailed work. An instrument equivalent to the alidade is used for sighting. The reference points for this work are taken from astronomical observations where no established points are available. Elevations are established by taking measurements from the sea wherever possible. For tie-in points in this work a grid system is set up.

Astronomical Observations: When a reference point was needed from which to locate one's position and to establish a survey system, astronomical observations were made. Hildebrandt's Universal instrument is used for this purpose.

Compass: This instrument is used for obtaining dip and strike of the rocks. The fossil ice in the Arctic offered a considerable problem in obtaining these observations.

Drilling: This method of exploration is used both for mineral and oil prospecting. The only great problem encountered in this type of work was drilling through salt which becomes very viscous and retards the rotary motion of the drills. Permafrost does not offer any great difficulty since it melts under the friction of the bit. In cold regions the problem of keeping the drilling water from freezing was met by putting salt in it. The deeper the hole, the less salt was used for the solution. Casing was usually used down to 200 feet in permafrost and in other regions it was used to varying depths depending on local conditions. The Soviets' method of straightening a drill hole is about the same as in the US--using a wedge. If they hit large underground cavities, cement is used to plug them up. For small cavities they rely on the careful drilling technique of the operators to circumvent the difficulties. The drills were in operation twenty-four hours a day with the crews working eight-hour shifts unless it was necessary for them to work longer. A geologist is at hand all the time to supervise the handling of the core and logging of it. A daily log sheet was sent to the chief geologist on which the percentage of core about drilled, hardness, kind of rock, damaged, etc, were recorded. An electrical method is used to determine the angle of drill holes. The sludge, as well as the core, was used in analyzing the holes. [redacted] in the USSR the deepest well drilled was 13,200 feet. Drilling in the Murmansk area (Kola Peninsula) was very difficult due to the presence of large boulders in the ground.

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Drilling for mineral explorations: These types of holes were drilled to a depth of about 1,000 to 1,800 feet. The core barrels are 6 to 9 feet in length and this limits their runs to this length. (The diameter of the core is 1.9 inches and is taken at this size the complete length of the hole.) At present they have no method of bringing up the core barrel without pulling the drill rods each time. Their equipment was bought and copied from Sweden and works on about the same principal as US equipment--gasoline or Diesel engine for power, worm gears to transform this power to vertical rotary motion. Their drilling tripods are about 20-30 feet high and mounted on slides (in the Arctic) for easy transportation by tractor towing. Diamond bits are used very seldom and are allowed to be used only when going through very tough work as granite or gneisses. When a diamond bit is worn out, three men have to make reports as to its condition for confirmation. The common bit used is set with angular pieces of a secret, very tough metal (Febedit). They do their own bit settings at the base. To determine the pattern and extent of drilling, the region in question is first worked over by the geophysicist and geologists and then from these results they draw up their plans to explore and block out the ore bodies.

Oil drilling: The equipment used for this type of drilling was bought from the US (Ensco) and is now copied with some changes. The city of Baku on the Caspian Sea is the center of manufacture of this equipment. Their rigs are about 100 feet high with cables attached (in the Arctic) for support against the prevailing high winds and are mounted on slides for easy transportation by tractor towing. They never use diamond bits, but possibly use a Hughes bit. The principle of power for these drills are steam-operated reciprocating engines, as coal is more accessible than oil. Core is taken only when necessary and when not a Rishtadl bit is used. Clay is put down the wells to plug up the pores of the formation passed through.

Porosity: This is done by observation of the core. Electrical methods are used too.

Radio Activity: This is measured by the Geiger counter or an instrument of the same type.

Petrography: Extensive slides are made from core and other sources for analysis.

Paleontology: Special emphasis is placed on micro-fauna for correlation of formations and rocks.

Photography: The stereoscopic camera is used by geologists in their field work and such cameras are provided for them.

Gravity: They analyze the specific gravity of rocks from core samples.

4. There is a special oil which comes from Besser in the Baku Region that has the peculiar property of not freezing in the extreme cold climate. This is what helped the Soviets in their fight against the Germans (who did not have this oil) in World War II. The above oil is taken from Besser to Yaroslavl, Constantinov's plant for manufacture of this insecticide.

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